

WHAT IS CLAIMED IS:

1. An image capturing apparatus for obtaining information regarding a depth of a subject, comprising:

an illumination unit operable to cast a first illumination
5 light beam, having a first wavelength as a main component, and
a second illumination light beam, having a second wavelength and
a third wavelength as main components,

said first and second illumination light beams being
modulated such that intensities of said first and second
10 illumination light beams are changed along respective traveling
directions,

said second and third wavelengths being different from said
first wavelength; and

a depth calculation unit operable to calculate a
15 depth-direction distance to said subject based on outgoing light
beams from said subject onto which said first and second
illumination light beams are cast.

2. An image capturing apparatus as claimed in claim 1, wherein

20 said first illumination light beam is modulated such that
said intensity thereof monotonously increases or decreases along
said traveling direction of said first illumination light beam,
and

said second illumination light beam is modulated such that
25 said intensity thereof monotonously decreases along said traveling
direction of said second illumination light beam when said
intensity of said first illumination light beam monotonously
increases along said traveling direction of said first illumination
light beam, or increases along said traveling direction of said
30 second illumination light beam when said intensity of said first
illumination light beam monotonously decreases along said
traveling direction of said first illumination light beam.

3. An image capturing apparatus as claimed in claim 1, further comprising a modulation unit operable to change said intensities of said first and second illumination light beams by temporal modulation.

5

4. An image capturing apparatus as claimed in claim 3, wherein said second wavelength is shorter than said first wavelength and said third wavelength is longer than said first wavelength, and

10

said image capturing apparatus further comprises:

an optically converging unit operable to converge said outgoing light beams from said subject onto which said first and second illumination light beams are cast;

15

a separation unit operable to optically separate said outgoing light beams into a first outgoing light beam having said first wavelength and a second outgoing light beam having said second and third wavelengths;

20

a light-receiving unit operable to receive said first and second outgoing light beams after being separated by said separation unit and converged by said optically converging unit; and

a light intensity detector operable to detect intensities of said first and second outgoing light beams received by said light-receiving unit,

25

wherein said depth calculation unit calculates the depth-direction distance to said subject by said intensities of said first and second outgoing light beams.

30

5. A distance measuring method for obtaining information regarding a depth of a subject, comprising:

an illumination step for simultaneously casting a first illumination light beam, having a first wavelength as a main component, and a second illumination light beam, having a second wavelength and a third wavelength as main components,

said first and second illumination light beams being modulated such that intensities of said first and second illumination light beams are changed along respective traveling directions thereof;

5 a separation step for optically separating outgoing light beams, from said subject onto which said first and second illumination light beams are cast, into a first outgoing light beam having said first wavelength, a second outgoing light beam having said second wavelength, and a third outgoing light beam
10 having said third wavelength;

 a capturing step for capturing said first, second and third outgoing light beams;

 a light intensity detection step for detecting intensities of said first, second and third outgoing light beams; and

15 a depth calculation step for calculating a depth-direction distance to said subject based on said intensities of said first, second and third outgoing light beams.

6. A distance measuring method as claimed in claim 5, wherein
20 said depth calculation step includes calculating said depth-direction distance to said subject based on said intensity of said first outgoing light beam and a value based on said intensities of said second and third outgoing light beams.

25 7. A distance measuring method for obtaining information regarding a depth of a subject, comprising:

 an illumination step for simultaneously casting a first illumination light beam, having a first wavelength as a main component, and a second illumination light beam, having a second
30 wavelength and a third wavelength as main components,

 said first and second illumination light beams being modulated such that intensities of said first and second illumination light beams are changed along respective traveling directions thereof,

second wavelength being shorter than said first wavelength,
said third wavelength being longer than said first wavelength;

a separation step for optically separating outgoing light
beams, from said subject onto which said first and second
5 illumination light beams are cast, into a first outgoing light
beam having said first wavelength and a second outgoing light beam
having said second and third wavelengths;

a capturing step for capturing said first and second outgoing
light beams;

10 a light intensity detection step for detecting the
intensities of said first and second outgoing light beams; and

a depth calculation step for calculating a depth-direction
distance to said subject based on said intensities of said first
and second outgoing light beams.

15